Contributions to Oriental Herpetology I.—The Lizards of the Andamans, with the Description of a new Gecko and a note on the Reproduced Tail in Ptychozoon homalocephalum.—*By* Nelson Annandale, B.A., *Deputy Superintendent of the Indian Museum.*

In a recent paper on the distribution of the Indian vertebrates Blanford (1) says regarding the Andamans and Nicobars, "These islands are included because they are under the Government of British India, but they are of small importance zoologically." A collection of lizards from Narcondam, lately presented to the Indian Museum by Major A. R. Anderson, I.M.S., has led me to doubt whether this summary dismissal by so catholic and liberal an authority does not perhaps unduly minimize the zoological importance of the Andamans, however true it may be of the Nicobars, the faunistic separation of which from the neighbouring archipelago he fully recognizes. The Indian Museum is rich in material for a study of the Andaman fauna, and it has seemed worth while to undertake an analysis of this one sub-order, even though I have few facts that are absolutely new to put on record and only one new form to describe.

The following list, probably still far from complete, embodies what I have been able to discover as to the species of lizards known from the Andamans or represented in our collection. I understand that Major Anderson is about to publish an account of the fauna of these islands and am much indebted to his generosity in permitting me to make use not only of his collection but also of his observations on the distribution of *Calotes versicolor* in the archipelago. Those species in the list which are also known from the Nicobars have their names distinguished by a star.

Lizards known from the Andamans.

Geckonidæ.

Gymnodactylus rubidus (Blyth); *Gonatodes andersonii* nov.; *Hemidactylus frenatus** (Schleg.); *Gehyra mutilata** (Wiegm.); *Lepidodactylus lugubris* (D. & B.); *Gecko verticillatus* Laur.; *Gecko stentor** (Cant.); *Ptychozoon homalocephalum*[1] * (Crev.) ?; *Phelsuma andamanense*, Blyth.

[1] I am not altogether satisfied with the evidence on which this species is included. A specimen which I thought to be from the Andamans (*Ann. Mag. N. H.* (vii) xv, 1905, p. 31) appears to have been labelled wrongly. (But see Theobld, *Cat. Rept. Brit. Ind.*, p. 73.)

AGAMIDÆ.

*Gonyocephalus subcristatus** (Blyth) ; *Calotes versicolor* (Daud.) ; *C. andamanensis*, Blgr.[1] ; *C. mystaceus*,* D. & B.

VARANIDÆ.

*Varanus salvator** (Luar.)

SCINCIDÆ.

*Mabuia multifasciata** (Kuhl); *M. tytleri*, Blgr. ; *Lygosoma maculatum* (Blyth) ; *L. olivaceum** (Gray) ; *L. macrotympanum* (Stol.).

The Museum possesses a number of specimens of a Skink the exact position of which I am not yet prepared to state. They are closely allied to, if not identical with, *L. maculatum* (Blyth), but differ from the descriptions of this species in proportions. Possibly they may be new ; but as I have not yet worked through the Skinks in the Museum collection, I prefer not to express an opinion at present. The specimens were collected by Major Anderson on Narcondam.

ANALYSIS OF THE LACERTILIAN FAUNA OF THE ANDAMANS.

Gymnodactylus rubidus is a form peculiar to the Andamans. It has close allies in *G. marmoratus* of the Malay Peninsula and Sumatra (possibly occurring also in Tenasserim) and *G. khasiensis* of Assam. *Gonatodes andersonii* is closely related to *G. kandianus* of Ceylon, South India, Preparis Island (which lies between the Andamans and the coast of Burma to the north) and Engano,* an island off south-west Sumatra. Its exact relationship to this form is discussed below. Although it is difficult to split up the genus *Gonatodes* into definite sections, *G. kandianus* and *G. andersonii* may be said to belong to its Malabar, as distinct from its Malayan, division. In South India and Ceylon there are a number of species which have their headquarters within the Malabar Province of recent zoologists (chiefly on the hills of the east coast on the mainland) but extend into places not included therein. In the Malay Peninsula two species, *G. affinis* and *G. kendallii*, occur, the former of which possibly extends northwards into Tenasserim. On the whole they are distinguished from the Malabar species by their larger size, more brilliant coloration (in some cases), the greater degree of specialisation of their dorsal scales (in some cases), and above all by the absence of femoral or præanal pores in the male. The genus extends eastwards into the Malay Archipelago, is represented by a number of species in Tropical America, and by at least one in East Africa.[2]

[1] *Ann. Mag. N. H.* (vi.) viii., 1891, pp. 288, 289.

[2] Boulenger, *Ann. Mag. N. H.* (6) xvi., 1895, p. 173 ; and Tornier, *Zool. Jahrb. Syst.* xiii., 1900, p. 584.

Gehyra mutilata, *Hemidactylus frenatus* and *Gecko verticillatus* are house-lizards and have a wide adventitious range on coasts and islands, being easily carried with merchandize or personal baggage. On the mainland of Asia their range extends northwards and westwards from the Malay Archipelago, through Malaya and Burma, to the north-eastern districts of India proper. This range they share with many other animals. Of the three, *G. verticillatus* (which is only a house-lizard in some districts) is most restricted. Probably it does not occur in the southern part of the Malay Peninsula, though abundant (not as a house-lizard) in the northern, and the few specimens taken in Singapore would seem to have been introduced from Bangkok (where it occurs in almost every inhabited building) or Java. *Gecko stentor*, on the other hand, is usually a jungle species; in the dense woods of northern Malaya its peculiar cry is heard perpetually, though the lizard is seen but seldom. In Selangor and elsewhere, however, it has been known to take up its abode in houses. Its retiring habits render it somewhat rare in collections, and it is not known to occur west of Chittagong. *Lepidodactylus lugubris*, regarding the habits of which little or nothing is known[1], has a very wide insular distribution in the Indian and Pacific Oceans and occurs sparingly in Malaya and Burma.

Phelsuma andamanense is probably the most interesting of the Andaman lizards. Its allies are found not in the Malayan islands or on the mainland of Asia, nor even on the mainland of Africa, but in Mauritius, the Seyschelles, Réunion and Madagascar. The number of cases in which the names of authors of species are enclosed in brackets in the tables which accompany this paper shows how little reliance can often be placed on the generic distinctions of herpetologists; but *Phelsuma* would appear to be a natural genus, in which the species are closely related. It would not be difficult to confuse an example of the Andaman species in which the colours had faded with one of *P. cepedianum* from Mauritius, though the specific differences are much greater than those between *Gymnodactylus rubidus*[2] and *G. marmoratus*.[2]

Both *P. andamanense* and *G. rubidus* (also *G. marmoratus*) are arboreal. Probably they never enter houses.

In considering the fauna of any tropical district the Geckos have a peculiar interest. Their structure (especially that of the vertebral column, on which great stress must be laid) proves them extremely ancient, and their genera (except in a few cases, such as the *marmoratus* section of *Gymnodactylus* and the Malabar division of *Gonatodes*) lack the plasticity of some families. I have compiled lists

[1] That is in Asia. Schnee has a note on its habits in the Pacific (*Z. Natur.* Stuttgart, 1901) which I have not seen.

[2] These two forms were once placed in separate genera.

of the Geckos of Burma and Sumatra for comparison with that of the Andaman representatives of the family. Boulenger (3), as recently as last year, has published a list of the reptiles of the Malay Peninsula, and I need only say here that the Geckos, with a few exceptions, are the same as those of Burma. For information regarding the Sumatran species I am indebted chiefly to Werner's (5) recent memoir, and regarding the Burmese to Boulenger's volume (2) in the "Fauna of India" series and the same author's account (4) of Fea's collection, now in the Genoa Museum. Two species included have been described by myself (6) quite recently.

Geckos of Burma and Sumatra.

	Name of Species.	Burma.	Sumatra.
1	*Gymnodactylus pulchellus* [1] (Gray) §	× (Lower Burma)	—
2	,, *variegatus* (Blyth)	× (Lower Burma)	—
3	,, *peguensis*, Blgr. §	× (Lower Burma)	—
4	,, *feæ*, Blgr.	× (Lower Burma)	? (Sinkip Island)
5	,, *lateralis*, Wern.	—	×
6	,, *marmoratus* (Kuhl) §	—	×
7	*Gonatodes kandianus*, (Kelaart.)	? (Preparis)	? (Engano)
8	*Phyllodactylus burmanicus*, Annand.	× (Lower Burma)	—
9	*Hemidactylus frenatus* * (Schleg) §	×	×
10	,, *brookii*, Gray §	×	—
11	,, *subtriedroides*, Annand.	× (Upper Burma)	—
12	,, *leschenaultii*, D. & B §	?	—
13	,, *flaviviridis*, Rupp. §	×	—
14	,, *bowringii* (Gray)	×	—
15	,, *garnotii*, D. & B. §	×	×
16	,, *platyurus* (Schneid.) §	×	—
17	*Gehyra mutilata* * (Wiegm.) §	×	—
18	*Spathoscalabotes mutilatus*, D. & B.	—	×
19	*Lepidodactylus lugubris* * (D. & B.) §	×	—
20	,, *ceylonensis*, Blgr. §	×	? (Engano)
21	*Gecko verticillatus* Laur. * §	×	×
22	,, *stentor* (Cant.) * §	×	×
23	,, *monarchus*, Schleg. §	—	×
24	*Ptychozoon homalocephalum* * (Crev.) §	× (Lower Burma)	×

In the above list a × denotes the occurrence of a species, a — that it has not been recorded. The names of those species known from the Andamans are distinguished by a *, of those known from the Malay Peninsula by a §. The Geckos of Sumatra are still very imperfectly known, while the discovery of fresh species both in Upper and Lower Burma is probable.

Of the Geckos common to the Andamans and Burma or Sumatra all but *Ptychozoon homalocephalum*, *Gecko stentor* (which is sometimes found in houses) and *Lepidodactylus lugubris* (whose insular distribution

[1] We have in the Museum specimen from Lower Burma of an allied species not yet described.

would suggest that it too may be carried from island to island) are house-lizards, and as such of no importance in considering questions of geographical distribution. They may very well have been introduced in the nineteenth century. As regards *P. homalocephalum*, a curious fact in its life history may have had an influence on its dispersal; I mean the long period spent in the egg. An observation by F. H. Bauer (quoted by Gadow in *Amphibia and Reptiles*, p. 512) shows that this period may last for five *months*, and from eggs which I have examined in the Malay Peninsula I am prepared to conclude that this case was normal. It is obvious that an egg with a hard shell, to some extent impermeable to liquids, can endure conditions which would be fatal to a delicate young lizard. Boats have been carried out from the coast of Malaya to the Andamans in very much less than five *weeks*, and logs of wood must frequently come by the same route. *P. homalocephalum* lays but two eggs at a time; they adhere to leaves and tree-trunks. It is essentially a jungle species, but Flower has taken a specimen of the closely allied *P. horsfieldii* on a wooden post in the Botanical Gardens at Penang (*P. Z. S.* 1896, p. 868), showing that it may desert the jungle occasionally for human erections in the immediate neighbourhood.

Thus, of the nine Geckos recorded from the Andamans, the presence of five, possibly six, can be accounted for without assuming that they have been in the islands for any long period. The remining three are peculiar to the archipelago (including Narcondam). None of these have been recorded from the Nicobars; but one is closely related to forms on the nearest mainland, a second has Malabar affinities, while the third exhibits a Madagascan facies.

As regards *Gonatodes andersonii*, any argument derived from its relationship to *G. kandianus* has its weak point; for *G. kandianus* is, at any rate in some places, a house-lizard[1], and though it probably originated in the mountains of Ceylon or S. India, it occurs also in the plains; it may therefore, have been introduced by man into the Andamans. In any case it must be regarded as the ancestor of *G. andersonii*, which is merely an offshoot from it: whether we look upon the two forms as specifically distinct depends entirely on the answer we are prepared to give to the question, "What is a species?" I have given the Andaman form a name because it is convenient that things should have names, and because the lizard can be distinguished by characters which appear to be constant; but I should doubt whether it is a "physiological" species. Poulton (7) in one of the latest general contributions to the subject of specific characters, regards it as impossible, from a scientific

[1] It is worthy of note that the distribution of this species is much wider than that of its allies.

standpoint, to determine a species from a mere examination of specimens. Undoubtedly he is right. Without a study of bionomics it would be impossible to group together the seasonal forms of certain butterflies he instances, or to draw the line between closely related local races of many animals. But in a museum—and too often the naturalist exists for the museum, not the museum for the naturalist—any system of arrangement is impossible, unless names are given to specimens. Anyone who would have the courage, the skill, and the patience (and would live long enough), to classify the whole animal kingdom according to some system of numbers and letters, which could be recorded as in a library catalogue, would confer an enormous boon on scientific zoology. The tendency at present among systematists is to search for differences rather than relationships, and very little is being done in tropical countries to find out what these differences mean. No investigations are being made, so far as I know, to discover whether the members of the fauna of any given island or group of islands of limited extent are undergoing modification in any one direction. That this is probably the case even in Northern Europe is shown in a recent paper by Eagle Clarke (8), who points out that in the Farœs animals as distinct from one another as the wren, the starling and the house mouse (*Mus. musculus*) have all developed in the direction of increase of bulk and coarseness of the feet. The work of Darwin and of Wallace on island life is of course classical, and as such liable to be ignored. When they wrote and laboured on the subject the extraordinary elaboration of modern zoology had scarcely begun, and it was less easy to lose sight of philosophical principles. We now know a considerable part of what is to be known about the "species" of the larger Indian vertebrates, using the term "species" in the loose way to which the museum zoologist is condemned; we do not know, even in a few cases, why one animal survives[1] under any given change of environment while another, apparently just as fitted for survival and quite as variable perishes. It is not likely that we shall soon gain any such knowledge, at any rate in the tropics; for such problems can only be studied in the field. Collectors have rarely time to observe, and all that can be done in a Museum is to classify and anatomize dead and imperfectly preserved material.

The object of this digression from the subject strictly in hand has been to illustrate the position of the Andaman *Gonatodes* as a distinct form, and at the same time to point out that even where a fauna has

[1] For example, why is it that certain species of the Indian tank molluscs succumb almost at once if kept in an aquarium without ventilation, while others from the same tank live for a considerable period under such conditions?

been completely " worked out," the greater and the more important part of its zoology has still to be investigated.

To return to the Andaman lizards. Of the Agamids, one, *Calotes andamanensis*[1], is known from a single specimen in the Copenhagen Museum ; it is allied to *C. liolepis* of Ceylon. Another is *C. mystaceus*,[2] which has a somewhat restricted range on the mainland of S.E. Asia and is common about Mandalay.[3] Major Anderson tells me that, in the Andamans, *C. versicolor* is found only in the Cocos group, not south of Table Island. It is essentially a mainland form and does not, as a general rule, penetrate into primæval jungle. In the Siamese Malay States it is only to be met with in cultvated land or secondary jungle and I believe that this is also true of India. It generally lays its eggs at the base of bushes in hedges or plantations. According to Prain (11), there are several cultivated plants which have run wild in the Cocos, and if these were brought from the mainland or elsewhere as plants, it is quite possible that the eggs of this lizard may have been brought with them. Although it has been recorded from the southern districts of the Malay Peninsula, *C. versicolor* is rare south of the Perak and Kelantan Rivers, its place being taken by *C. cristatellus*, which is closely allied to *C. jubatus* of the Nicobars and Malayan Islands. The southward range of *C. versicolor* as a common member of the local fauna is greater on the eastern than on the western side of the mountains which form the backbone of Malaya,[4] as is also the case with of a number of other animals.

Gonyocephalus subcristatus, on the other hand, is peculiar to the Andamans and the Nicobars. *G. humei* (Stol.) also occurs in the latter islands, but I do not think that this species can be maintained. We have in the Museum two males from Tillinchong identified as *Tiaris humei* by Stoliczka and possibly the types of the species. From the same island we have a normal specimen of *G. subcristatus*, also named by Stoliczka ; but in a series from Kondal (an island in the other division of the Nicobar group), identified by the same authority as belonging to the latter species, I find a female which must be associated with the two males from Tillinchong. These three specimens are distinguished from the whole of a

[1] Boulenger, *Ann. Mag. N. H.* (vi) VIII, 1891, pp. 288, 289.

[2] I have found a well-authenticated specimen of this species from the Andamans in the Museum collection, which also contains several of *C. versicolor* from the Cocos.

[3] J. Anderson, *Res. Yunnan Ex.*, p. 806.

[4] It is convenient to confine this term to the Malay Peninsula, using " Malaysia" for the Malay Archipelago.

large collection (over one hundred specimens), made by different collectors in different islands of the Andamans and Nicobars, only by their greater size and more pronounced crest, which is interrupted in a very distinct manner just behind the neck and raised on a fleshy, laterally compressed hump in front of this point. On the whole, I am inclined to regard them not as representing a local race or even an incipient species, but as aged individuals of the common form. Against this view must be placed their rarity—and Major Anderson tells me that he has examined very large numbers of specimens without finding any like them. However, the adults of some Agamids (*e.g.*, *G. borneensis* and *Aphaniotis fusca* in the Malay Peninsula, *fide* Laidlaw (9)) are seldom taken as compared with the young, while in some cases (*e.g.*, that of *Calotes cristatellus* in Lower Siam) the largest individuals are only seen in very deep jungle, where of course there is less chance of their capture.

Of *Varanus salvator*, one of the bulkiest of lizards, I need say very little. It has practically the same range in Asia as *Gehyra mutilata* (except that it is found nearer the heart of India) and extends eastwards to Australia. Although it cannot be carried accidentally on ships, it is extremely tenacious of life and has frequently been observed swimming in salt water, though never far from shore. Probably it might survive in the sea for a considerable period clinging to a floating log, for it can go without food for weeks, if not months, without apparent inconvenience.

The Skinks, judging from the enormous number of closely allied species in the family, are among the most plastic of lizards ; yet some of them have an extensive distribution. Of the Andaman forms, *Mabuia multifasciata* is the common Skink of the Malay Peninsula and extends northwards into Burma, possibly into Sikhim, southwards and eastwards into the Malay Archipelago. Specimens from the Andamans, of which I have seen a considerable number, may differ to a slight extent, on the average but not individually, from those taken on the mainland ; for the proportion with quinquecarinate dorsal scales is probably greater than that given by Flower (10), who examined a large series in Malaya. *M. tytleri* and *L. macrotympanum* are only known from the Andamans. *L. maculatum* has a range similar (as far as the mainland of Asia is concerned) to that of *V. salvator ; L. olivaceum* does not extend so far to the north, but is characteristically Indo-Malayan.

In comparing the Agamidæ and Scincidæ of the Andamans with those of the Nicobars, we find that several forms occur in the later group which are absent from the Andamans but have Malayan or Malabar affinities. *Calotes jubatus*, apparently common in the Nicobars, occurs

in the Malay Archipelago, but has not been recorded from the Peninsula; *C. ophiomachus* is only known from Ceylon and S. India. Several Skinks probably occur in the Nicobars which are absent from the Andamans, and the same may be true of *Dibamus novæ-guineæ*—the sole representative of a family closely allied to the Skinks and once regarded as peculiar to the Nicobars and Papuasia, but now known to exist both in the Malay Peninsula and in several of the islands of the Malay Archipelago.

What is perhaps a true relationship between the Andamans and Ceylon consists in the absence from both of the genus *Draco*, which occurs within the Malabar province in S. India (also in Malaya, Burma and Assam) and consists of forms too striking to escape notice readily.

Prain (12, 13) has shown that the flora of the Cocos group and that of Narcondam differ considerably from that of the southern Andamans. The geological separation between the different islands, and especially between Narcondam and the rest of the archipelago, is well illustrated by the marine depths marked on the maps recently published by Alcock (13) and Kloss (14). Narcondam is distinguished zoologically by the possession of an isolated Hornbill (*Rhytidoceros narcondami*). I have very little information about the lizards of the Cocos, except that *Calotes versicolor* and *Gonyocephalus subcristatus* occur; on Narcondam Major Anderson has taken *Gymnodactylus rubidus*, *Gonatodes andersonii* and *Phelsuma andamanense*, as well as *Mabuia multifasciata* and another Skink. The three Geckos characteristic of the Andamans therefore occur on this island. Of three specimens of *G. rubidus* from Narcondam in the Museum, two are considerably larger than any in a large series from other parts of the Andaman archipelago; otherwise no difference can be detected. The only adult specimen of *G. andersonii*,[1] is from Narcondam, but, except in point of size, it agrees with two young individuals collected by Wood-Mason somewhere in the Andamans (exact locality not specified) and confused by him with the young of *G. rubidus*, to which they bear a close superficial resemblance. Specimens of *P. andamanense* agree in every respect with those from the other islands.

I do not propose to generalize as to geography on the basis of the lizards. The study of a single sub-order somewhat poorly represented (or perhaps rather imperfectly known) does not permit wide generalizations as to the whole fauna, much less the geology and geography, even of a small group of islands. It has been my object to show, in the first place, that the vertebrates of the Andamans are not devoid

[1] Since this was written two more have been received from Narcondam, collected and presented by Mr. C. G. Rogers.

of zoological interest, in the second that the study of the geographical distribution of animals must be preceded by a study of their bionomics.

Description of *Gonatodes andersonii*, nov.

Measurements.

Total length	...	...	...	73 mm.
Body	...	...	...	23 ,,
Tail	...	...	...	40 ,,
Head	...	...	...	10 ,,
Fore-limb	...	...	...	11 ,,
Hind-limb	...	...	...	16 ,,
Breadth of head		...	...	5 ,,

Closely allied to *G. kandianus* (Kelaart) from which it differs only in the following points :—(1) The habit is more slender, the limbs slightly, the tail considerably, longer ; (2) the scales on the back and sides are more nearly homogeneous, none of the former having a definite keel; (3) the spine-like tubercles on the flanks are much reduced, but not altogether absent ; (4) there are only five or six labials on each jaw. The scales on the belly are smooth, as in the typical form of *G. kandianus*, or feebly keeled. *G. andersonii* differs from *G. gracilis* (another very close ally of *G. kandianus*) chiefly in respect of its proportions, but also in its scaling. The specimens have been compared with examples of *G. gracilis* named by Boulenger and of *G. kandianus* from the Sarasins' collection.

I have also examined specimens of *G. wicksii* (Stol.) from Preparis which have been identified by the author of the species and may be his types. They agree exactly with Boulenger's description of *G. kandianus* and also with specimens of this species from Ceylon regarded by Theobald as typical of *G. humei*. There can be no doubt, therefore, that Boulenger was right in considering both these names to be synonyms of *G. kandianus*, as he does (but with a query) in the "Fauna of India" and his *Catalogue of Lizards*.

In a recent paper (6) I identified, with some doubt, the immature specimens of *G. andersonii* in the Museum with Beddome's *G. marmoratus* from S. India. The examination of an older specimen in better preservation shows that I was wrong.

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Note on the Reproduced Tail in Ptychozoon homalocephalum.

I am not aware that the appearance of the tail after it has been lost and reproduced has been described in this species. It has a certain interest, because Müller[1] regards the character of the lobes of the tail as being of some importance as a specific distinction in the genus. In a specimen from the Nicobars, lately presented by Major Anderson to the Indian Museum, the distal part of the tail is reproduced. The scales upon it are slightly smaller than those upon the uninjured portion, and the dorsal tubercles are completely absent. The loose membrane surrounding it is only about half as wide as is normal, asymmetrical, not divided into lobes or expanded at the tip of the tail. Thus the condition differs considerably from that apparently normal in *P. horsfieldii*, Gray, but rather less so than from that of the uninjured tail of *P. homalocephalum.*

[1] *Festschr. Nat. Ges. Basel*, 1892, p. 209.